



Warwick Research Unit for the Blind



ANNUAL REPORT

April 1975 - March 1976

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March 1976

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1. Introduction

This first Annual Report has been produced as a general brief survey of the activities of the Research Unit. It is hoped it will prove appropriate for a wide range of readers including those who have generously given financial assistance, advice or lent equipment.

Significant progress has been made on techniques for producing braille with particular emphasis on the utilisation of information already in digital form. Close contacts have been maintained with a large section of the visually handicapped community.

The last twelve months have been dominated by acute financial problems which have now been resolved in the short term. The Unit was reduced from four to two full-time staff but it can now continue at this size for another year.

2. Present Personnel

Prof. J.L. Douce	part-time supervisor of the Unit
Dr. J.M. Gill	full-time senior research fellow
Mrs. L.C. Wooldridge	full-time secretary
J.B. Humphreys,	part-time programmer (6 hours per week)
Mrs. P.A. Foxon	part-time research assistant (6 hours per week)

Students from the Department of Engineering are also involved in specific projects.

3. Transcription of Short Documents

Braille readers often have problems in having short documents transcribed quickly into contracted braille. Typical documents are agendas and minutes of meetings, instructions for domestic appliances, local telephone dialling codes, knitting patterns and personal correspondence needed for reference. Typically the number of copies required is from one to six. This project is concerned with investigating the viability of using a computer-based transcription system based on existing technology to provide this personal service.

The Sensory Aids Evaluation and Development Center provided the Unit with a copy of DOTSYS III which is a computer program, written in Cobol, to translate text to a good approximation to Grade II American-English braille. The version currently in use at Warwick uses 13k words of store, with initialisation overlaid, and translates at 5000 words per minute to a good approximation to Grade II English braille.

The basic system for producing short documents in contracted braille is:

- (i) A typist, with no computing knowledge, inputs the text on punched cards, paper tape or directly on a visual display unit. Control

characters, for new paragraph etc., are also added by the typist as she inputs the material (i.e. the text is not annotated by someone else).

- (ii) A line printer listing of the text is produced in order to proof-read for typing errors.
- (iii) The text is interactively edited on a visual display unit with a program designed specifically for this purpose. This program has been designed for speed of operation, minimal computing requirement and for ease of use by operators with no experience of computing.
- (iv) The text is translated to a good approximation to Grade II standard English Braille, and the translation is stored on magnetic tape.
- (v) The braille is output on an on-line embosser.

Only the translation phase requires extensive central processor time; all other computer operations use less than 1% of the central processor time, and can be time shared with other unrelated programs.

The current output of the system is about 20,000 braille cells (circa 30 pages) per day. Allowing for multiple copies, such that on average about two copies of each document are produced, this means that 15,000 braille cells are translated per day, requiring less than one minute of central processor time for translation. It is not envisaged that this output can be increased with existing facilities (particularly staff) since the typist is currently the only full time worker on this project, and she also undertakes all proof reading and routine secretarial duties associated with the project.

An important feature of the project is the assessment of demand, cost, and achievable service in terms of acceptability of the quality of the computer produced braille and turn round time. In the first few months of operation the system was undergoing almost continual modification based on informal feedback from the blind subjects which made it impractical to start a formal evaluation programme immediately, but an initial analysis has yielded the following information.

The material transcribed can be roughly grouped as:

<u>Subject</u>	<u>%</u>
Domestic	10.4
Leisure	15.4
Religious	2.5
Education	25.4
Employment	29.1
Miscellaneous	17.2

A questionnaire was circulated to the blind subjects who had used the system. The results show that both the number of misconstructions and the use of single-sided braille are acceptable for this application. This project has demonstrated that there is a considerable demand for short documents in braille, and that computer-based systems can potentially satisfy a significant proportion of this demand.

The traditional braille cookery book is made of manilla paper bound in a large volume. This means that the blind housewife has to allocate sufficient working space for the cookery book, and has to wash and dry her hands each time she wishes to refer to the recipe. The system tested at Warwick involved reproducing the recipes in plastic sheet and bound loose-leaf in a ring binder. The recipes can be removed from the folder and sponged down after cooking. The reaction of the users has been uniformly favourable so the details of the system have been passed on to the established service organisations.

Reading stimulation often comes from family and friends being able to join in. Braille looks completely alien to parents (who are often non-brailleists), siblings and friends. Some books were produced in both braille and print - each braille page having a corresponding large print page bound opposite, so that anyone can participate.

These books include short stories, interlined stories for the very young and a puzzle book incorporating a tactile maze. Encouraging comments have come back from the children, expressing enjoyment in being able to involve their family and friends and asking for "more please".

4. Braille Bank Statements

The time consuming, and therefore expensive, stages in the computer production of braille are the input of the text, proof-reading and correction of the typing errors. These stages can be bypassed when the data is already available in digital form. This is a general area which seems to offer considerable scope for continuing investigation.

Lack of privacy is one of the most serious deprivations caused by blindness therefore the availability of bank statements in braille can be very important to some blind individuals. Manual production requires highly skilled braille transcribers who are in short supply, also manual transcription usually introduces a considerable time delay. In order to be useful bank statements must be up-to-date, and no errors can be tolerated. These conditions are met by the automatic transcription of statements from digital data provided by the banks. Lloyds, Lewis's and Midland banks use this system on a regular basis to provide braille statements to their blind customers.

The banks supply the data recorded digitally in print-image format on 9-track magnetic tape but the names and addresses of the customers are not included. The program to

convert the print-image format to the braille format is written in Fortran IV for the Sigma 5 computer. As well as changing the format, the program checks that the input data is in the correct fields and that the final balance is correct. If there were an error, the braille statement would be suppressed and an error message would be output on the line printer. The program also produces a sighted printout in the same format as the braille version in order to assist the customer's branch in dealing with any queries which the blind customer may raise.

Another advantage of this automated system is speed; it takes only a matter of minutes to produce a batch of statements from the digital tape. Demand for this service is currently about 100 braille pages per week. In normal operation the braille copy of the statement, together with the inkprint version, is dispatched from the Unit within 24 hours of receipt of the magnetic tape (over the last three months mean turn-round time for the batch of Midland statements has been $2\frac{1}{2}$ hours).

5. Computer and Control Abstracts

For any blind person with a scientific or technical background, keeping up-to-date with his subject raises special problems. The sighted person can go to his library and browse at will; and it is an accepted part of the work environment that resources are made available for him to do so. The blind person must obtain the help of his sighted friends and colleagues to read relevant articles for him; but before he can even do this, he needs a means of identifying what is relevant to him from current scientific literature. In the absence of any braille alerting service, he must depend upon having access to a sighted colleague with an equivalent technical background and a proper understanding of his interests.

This is a very real problem in the field of computer science, where technological change is rapid and continuous.

In other respects, computing has been able to offer particularly good opportunities for the employment of blind staff on equal terms with their sighted colleagues. To give some idea of the size of the problem INSPEC, the information service run by the Institution of Electrical Engineers, adds about 130,000 items per year to its data base which covers physics, electro-technology, computers and control. To handle this volume of information the system is, of necessity, computer-based. The routine INSPEC service provides each subscriber with a list of articles within the user's personal fields of interest. With our pilot scheme, each month INSPEC supplies the Unit with a computer-readable tape containing abstracts of recently published articles from computer science journals. A computer program automatically selects the abstracts of specific interest to each blind programmer. The text is then automatically translated to contracted braille which is embossed directly on manilla paper. The braille is ring-bound, with stiff covers to protect the embossing, before being dispatched to the blind users.

6. Psychological Abstracts

In cooperation with the American Psychological Association a service similar to that described previously is provided for alerting a group of blind psychologists to articles of specific interest to them.

7. Educational Abstracts

This system is different in that it is a retrospective search of the Educational Resources Information Center data base. With our pilot scheme, the blind user specifies a closely defined subject area and the computer program searches the data base for relevant abstracts of articles. The search starts with the most recent abstracts and will automatically stop when it has found a predetermined number of abstracts. This latter facility is to protect the blind person from receiving an excessive amount of output which happens if the subject area is not closely defined.

8. Compositors Tapes

In the printing industry compositors tapes have been in use for many years. However the traditional system involves correcting the error on the type itself and not on the compositors tape. There are also a multiplicity of codes in use which make it difficult to write a computer program to read a range of these tapes.

However error-free computer-compatible tapes are now becoming available with the introduction, by printers, of computer-based composing systems. These tapes offer an inexpensive fast method for producing braille books which only include ordinary text (i.e. no mathematics, music, tables or diagrams).

The Unit is working in collaboration with Cambridge University Press who generate tapes which are error-free and contain many control characters desirable for the automated production of the braille edition. A sample section of a book has been successfully produced in braille.

9. International Register of Research

In collaboration with L.L. Clark of the American Foundation for the Blind, a register has been compiled of current research on blindness and visual impairment. The register contains the names, addresses and brief description of projects of those who are working in the natural, behavioural and technological sciences bearing on problems arising from visual impairment. This register does not include medical research.

The register also includes:

- (i) Abbreviations of the names of organisations concerned with research for the blind and visually impaired.

- (ii) Periodicals which sometimes include relevant articles with significant research content.
- (iii) Abstract journals, information services and data bases which claim to cover some, or all, of this field.
- (iv) Brief list of some standard reference books.

The register has been produced at Warwick in both ink-print and braille. The braille edition was produced automatically from the digital data base used for the inkprint version.

10. Braille Automation Newsletter

In collaboration with L.L. Clark, the Braille Automation Newsletter is being produced as an aid in communicating among that community of researchers and developers interested in applied research involving braille production with computer-assisted systems. The first issue was produced at Warwick in February 1976; initial reaction of the readers has been favourable.

11. Soviet Union

In May 1975 Dr. Gill visited the Soviet Union as a guest of the All Russia Society for the Blind. The visit proved most useful and the hosts were extremely helpful in arranging meetings with the research workers. The scope and scale of Soviet research on aids for the visually handicapped was most impressive. This visit has resulted in increased contact between Warwick and research workers in the Soviet Union.

12. Funding

The financial assistance of the following organisations is gratefully acknowledged:

American Foundation for the Blind
Bank of England
Barclays Bank Ltd.
British Council
Department of Health and Social Security
Lloyds Bank Ltd.
Medical Research Council
Midland Bank Ltd.
National Computing Centre
National Westminster Bank Ltd.
Ocean Transport & Trading Ltd. (P.H. Holt Trust)
Royal National Institute for the Blind
Science Research Council
Solihull Association for the Blind
University of Warwick, Department of Engineering
University of Warwick Women's Group
Williams and Glyn's Bank Ltd.

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